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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

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FEDERAL COMMUNICATIONS COMMISSION
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In the Matter Of	)	
Amendment of Part 15 of the	)	
Commission's Rules to Permit Operation	)	
of Biomedical Telemetry Devices on	)	ET Docket No. 95-177
VHF TV Channels 7-13 and on	)	
UHF TV Channels	)	
	)	

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COMMENTS OF THE NATIONAL ASSOCIATION OF BROADCASTERS

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EXECUTIVE SUMMARY

Here petitioner is urging the Commission to increase the power and the available frequencies for certain medical telemetry devices. The bases for the petition are the alleged shortage of currently available spectrum for such uses and the asserted reliability problems associated with such devices – problems said to be created, at least in part, due to the high levels of ambient electrical noise in hospitals.

While the National Association of Broadcasters ("NAB") does not object to the goal of creating more reliable and efficient medical telemetry devices, we cannot support the approach advanced by petitioner. It is our strongly held view that the power increases sought by petitioner would result in intolerable interference to over-the-air television service in many situations and under many geographic and topographic conditions.

Plainly, the petitioner has not provided the kind of engineering data or theory necessary to justify anywhere near the kind of massive power increases proposed. It has used, for example, inappropriate assumptions for protection of both analog and digital television systems. Even more importantly, the record clearly does not support the concept of such medical telemetry devices operating in environments outside of a hospital setting.

The Commission should not grant petitioner's request for expanded operation of such unlicensed devices. Any further pursuit of the matters of power increases and frequency eligibility should be conducted in the context of a further rule making – a rule making that would develop a more thorough record and a regulatory plan that would incorporate appropriate, practical controls. Only under such a comprehensive technical

and policy review may the FCC make a responsible judgment concerning any expanded use of such medical telemetry equipment.

permitted power for these devices' operations. Specifically, petitioner seeks permission to have these devices operate on vacant VHF television channels in the frequency band 174-216 MHz (TV channels 7-13) and on all vacant UHF television channels. For all such operations petitioner seeks the ability to operate with up to five milliwatts power.

Petitioner bases its request on the asserted shortage of currently available spectrum for the operation of these devices, as well as the perceived need to increase power due to the high levels of ambient electrical noise in hospitals -- noise which, petitioner asserts, is so high as to threaten the continued usefulness of these devices.[4]

While NAB is sympathetic to the need for effective medical telemetry, the potential for interference from the proposed unlicensed, unrestricted use of such devices is much too large for broadcasters, the Commission and the public to accept. Moreover, sharing currently unused TV channels, even with proper controls, may only be a short term solution, given the uncertainty about re-packing of the spectrum.

Indeed, the field and engineering data submitted by the petitioner does not attempt to establish facts to support a case for increased power to provide reliable communications. While we can appreciate that a power increase may be needed for operation of a reliable system in the UHF band (to obtain rough parity with systems that employ the VHF band), we cannot accept, without substantiating data, that an increase of the magnitude requested is justified, nor that such operation would be interference-free.

The medical telemetry device power levels currently established by the Commission are appropriately set, and for sound technical reasons. The levels predict that

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[4] Petition, *supra*, at 4.

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I. INTRODUCTION AND SUMMARY

The National Association of Broadcasters ("NAB")[1] hereby submits its comments in response to the Commission's *Notice of Proposed Rule Making* ("*Notice*")[2] in the above-captioned proceeding. This proceeding was initiated in response to a Petition for Rule Making ('petition") submitted December 23, 1994, by the Critical Care Telemetry Group.[3]

The essence of the petitioner's request is for the FCC to expand the range of frequencies upon which medical telemetry devices may operate and to increase the

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[1] NAB is a nonprofit, incorporated association of television and radio stations and networks which serves and represents the American broadcast industry.

[2] *Notice of Proposed Rule Making* in ET Docket No. 95-177, 11 FCC Rcd 1063 (1996).

[3] Petitioner's members are manufacturers of low-power electrocardiogram devices and other low-power medical telemetry devices.

Grade B contour level signal reception will not be impacted significantly unless a residence is unusually close to a hospital. Doubling these levels could be expected to double the radius of interference around hospitals, which can then be expected to include the first two or three rings of nearby residences. A 20 dB (10 fold) increase constitutes an enormous increase in a communication system. This proposal for a 42-60 dB (100-1000 fold) increase, without strong technical justification of the signal and noise budgets, cannot be accepted as a reasonable approach.

Perhaps a small increase in the allowed field strength for Part 15 devices in the VHF band could be shown to be unlikely to cause significant additional interference, as long as their use was restricted to hospitals, primarily due to the inherent structural shielding in such an environment. A further notice-and-comment proceeding could develop a record that establishes the kind of technical system performance that would be needed on a long-term basis. If such higher power is needed, these devices must be regulated under the appropriate sections of the rules for controlled operation, not Part 15.

II. DISCUSSION

A. The Claim That Higher Power Is Needed Is Not Substantiated and the Petitioner's Approach Is Unsound From the Perspective of Rational Spectrum Policy.

In the *Notice*, the Commission observes that the issue of ambient electrical noise was a reason raised by the petitioner for increasing the power of the subject devices.[5] However, the claim that current limits are too low was not supported by engineering analysis. Since systems today are operating in the 174-216 MHz band, with three meter

[5] *Notice*, *supra* note 2, ¶ 3.

field strengths of 1500 microvolts per meter, it would seem that the petitioner should meet a burden of proof that additional power is needed, based on measurements of environmental noise and calculations of receiver sensitivity to determine the signal to noise ratio needed to reach a given level of reliability.

With respect to the increasing level of interference; it should be noted that medical devices currently are specifically exempted from meeting Subpart B of Part 15's spurious emission requirements. This allows, if not encourages, design compromises which create the electromagnetic noise about which the petitioner complains. We further observe that increasing allowed emissions would create more noise for any receiver[6] that cannot process the emission, which in turn could lead to requests for more power to overcome the "noise" from other secondary systems. It also increases the chance of interference with primary services. This would be an undesirable sequence of events, from the perspective of rational communications policy. Instead, the Commission should adopt a policy approach focused on minimizing the level of spurious emissions from all electronic devices. Perhaps reducing spurious emissions to levels much lower than current Class B limits, rather than attempting to overpower these emissions, would minimize this electromagnetic noise condition.

B. Establishing Appropriate Separation Distances, Combined With Mandatory Controls On Use, May Accomplish Petitioner's Goals.

Certainly one feasible way to avoid interference to broadcast television reception from a higher power device would be to establish minimum separation distances, as

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[6] Good examples are cellular telephone receivers.

proposed by petitioner[7] and acknowledged by the Commission.[8] However, valid engineering data must be established and used to calculate those separations. As plans for re-packing the spectrum are not yet determined, we cannot assess if there would be adequate frequency space to meet the medical telemetry need in this fashion.

Not only do we share the Commission's concerns, as expressed in the *Notice*[9] about the non-interfering implementation of the proposal; we are far from persuaded that additional power is needed. We will accept the assertion that the VHF frequency bands are congested and that a wider range of frequencies perhaps should be permitted for an important, if non-interfering, sharing of the spectrum. But, we cannot accept the notion that huge (100-1000 fold) power increases are justified, as no engineering data supporting the need for such power increases is in the record. The engineering data in the record do not support unlicensed operation in the UHF spectrum; nor do the data support operation outside of hospitals in the VHF spectrum.

We agree with the Commission's position that any operation of these secondary service devices – devices that might work well in the period leading to the rearrangement of the spectrum for the introduction of advanced television -- must cease if there is interference with digital television.[10] Further, if a digital channel is authorized, and operation of any secondary service causes interference with the HDTV, then secondary operation must cease immediately, not later when the spectrum is re-farmed.

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[7] Petition, *supra* at 7-8.
[8] *Notice, supra note 2, ¶ 4.*
[9] *Id.*, ¶ 5.
[10] *Id.*, ¶ 6.

In response to the Commission's invitation for comments,[11] we believe that sharing of the VHF and some sharing of the UHF spectrum with higher power (though not as large as that which is proposed) medical telemetry devices *may be* possible and practical, *provided* there are adequate controls (such as those in Part 90) to insure cochannel distance separations and frequency coordination with other secondary users. However, we are very skeptical about the effectiveness of the customer (hospital personnel) in insuring that cochannel separation distances are maintained for the proposed higher power unlicensed devices. Alternatively, as long as the allowed power increase for VHF (only) devices were very small, we expect that the petitioner could show that the typical shielding and separation of hospitals from residences should provide enough of a margin to minimize the potential for interference to acceptable levels for unlicensed VHF operation at somewhat higher levels.

C. Optimal Frequency of Operation.

We believe that the upper VHF band should be preferred over the UHF band for these medical telemetry operations, primarily due to building attenuation characteristics. Operation above 900 MHz, with different modulation approaches, would also be preferred over operation on UHF TV channels. This could include ultra-wide-band operation in the 1 to 3 GHz range, at very low powers.

We agree with the Commission that a record needs to be developed to show how much spectrum may be needed to support biomedical telemetry and determine the optimal operating frequency and power ranges. Such a proceeding should be instituted so that

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[11] *Id.*, ¶ 7.

needed engineering and allocations data can be gathered to help guide policymakers in this area.

D. Frequency Agility And Construction Options.

The Commission proposes that the telemetry devices be designed to support changes in their operating frequency over a range of TV channels.[12] We think it likely that different designs will be the optimal solution for each of the VHF and the UHF ranges. As such, ability to tune a set of channels should not create a significantly increased burden on the design effort or cost.

We believe that the five milliwatt power level proposed for biomedical telemetry devices is ill advised, unsupported and inappropriately high for a Part 15 device. The Commission correctly seeks to build a record to identify and establish the requirements for this important communication system, while minimizing interference to other services. While this fact-gathering task is very important, only examining the transmitter end will not accomplish this goal. Optimal solutions may involve different modulation systems than those currently used. Different modulation methods can be expected to have different interference impacts on analog and digital TV signals. Once a broader record is developed, through the gathering of comments and supportive studies in response to a Further Notice, then the potential for interference can be properly assessed and a decision can be made about which set of controls is needed to guarantee the least amount of interference potential.

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[12] *Id.*, ¶ 8.

E. Device Emission Measurement Criteria Issues.

We generally favor adoption of a field strength standard, for the reasons the Commission outlines. However, in such an application there are trade-offs to be considered. If a power level into an antenna array is used as the criterion, then a maximum must be placed on the gain of any antenna which is used. We are concerned about field use of antennas, such as table mounted antennas, which could be used to produce higher field strengths than those created from body mounted antennas. If a field strength standard is used, then the selection of a measurement process becomes extremely critical, so that a low-gain antenna arrangement would not be re-arranged for actual use to produce higher field strengths. As long as the antenna is worn, the human body will change the gain from whatever the test conditions may be. With proper procedures, either method could achieve the objective of fair measurement of the limits.

NAB believes that the current out-of-band limit of 150 microvolts per meter at three meters should be maintained, independent of the power level permitted or licensed *vs.* unlicensed operation. This signal level can be expected to cause interference to a Grade B signal, unless a combination of factors is present. In the VHF range, the hospital building attenuation, the typical separation of the hospital from residences and the residence antenna directivity should work together to produce adequate attenuation. However, to the degree that hospitals are located outside of the Grade B contour(s) of TV stations, some television viewers may experience interference to their reception even if medical devices employ the above-referenced emission levels. These situations and others where the attenuation will not adequate, due to reduced separation, unusual architecture

(the presence of numerous large glass windows) or major signal path distortions due to reflection or shielding can be expected to be acceptably infrequent.

If the Commission were to take the imprudent step of permitting biomedical telemetry operation in arbitrary locations – *i.e.* outside of hospital environments, then interference could be expected from these spurious emissions, in addition to interference from the intended emissions.

F. The Calculation Of Proposed Protection Distances Does Not Withstand Technical Scrutiny.

The more powerful signals from the proposed devices certainly would necessitate effective protection provisions, as the Commission acknowledges. The cochannel separation distances developed by the petitioner are based upon the assumption that the protection levels for NTSC to NTSC broadcast stations are technically appropriate to apply. We do not accept the appropriateness of the assumptions used. The precise placement of the cochannel signal relative to the NTSC signal components can be expected to be an important consideration. There were no data provided by petitioner to show the D/U ratio of the typical telemetry signal into the NTSC signal for cochannel interference, much less data to show the impact as the positioning varies with respect to the color or sound subcarrier signals. Different modulation methods could have different impacts. The petitioner claims there is no risk of interference to existing television reception and cites the petition's appended Engineering Statement,[13] which makes that claim, but no support for that claim is cited by the Engineering Statement or is in the record.

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[13] See Petition, supra Exhibit A, at 4.

The analysis of the HDTV interference in Table 4 of the Engineering Statement did not cite the source for the protection ratios used; but they appear to be preliminary Grand Alliance test values. However, they do not match the actual Grand Alliance system test objectives, and no amendment has been placed in the file of this proceeding that reflects the actual test results from the unbiased tests, conducted by the Advanced Television Test Center ("ATTC"), that were available in September of 1995. The HDTV interference into NTSC tests by ATTC indicated that 2 dB to 6 dB greater adjacent channel protection rations were needed than those for NTSC into NTSC. The cochannel ratios needed were not as large. The 6 MHz HDTV signal is really only 5.3 MHz wide to create a guard band between it and the adjacent channel. Undoubtedly a 200 kHz telemetry signal in this guard band would have more potential for interference than one at the same nominal field strength in the center of the channel. Given the lack of objective technical data in the record of the instant proceeding, it is not clear that the calculated separations are appropriate for UHF channels. For use on VHF channels, in hospital buildings, the shielding of such major structures provides a safety margin which addresses this uncertainty. But, the separations are not valid once operation outside a hospital is considered, as this safety margin is removed. Engineering data would be needed to assess the appropriateness of this separation for UHF channel use or for VHF use outside of hospital structures.[14]

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[14] As noted elsewhere in these comments, NAB opposes the use of such medical devices outside of hospital environments.

G. De Facto Abdication of Responsibility Must Not Be Permitted.

The Commission goes to the heart of a key issue when it asks ".. who will be responsible for ensuring adherence to the separation distance requirement."[15] The practical answer, were the Commission to grant petitioner's request, would be no one! Consumers would change the channel, not complain. The consumer cannot be expected to determine the source of interference, especially when it may be a hospital many miles away. Other secondary services might interfere with medical telemetry (or *vice versa*), as they would not know of the source of interference: medical devices operating on these frequencies. Even if frequency coordination is required as part of the solution, controls and accountability must be established for resolution of the interference problems which, even with usage restricted to hospitals, nonetheless may occur. Perhaps specific hospitals could use specific channels, a type of site license, to minimize this potential.

H. Allowing Unlicensed Operation Outside of Hospitals Would Be A Serious Mistake.

The Commission is correct to be concerned about the potential for interference if biomedical telemetry devices were to be permitted to operate outside of hospitals. This is perhaps the most serious aspect of this *Notice*. While major structures such as hospitals can attenuate signals on the order of 20 dB for VHF frequencies, this attenuation is not appropriate to apply to attenuation of the TV channels in the UHF band, nor to apply to either VHF or UHF for other structures. Antenna theory indicates that if the frequency of operation is at (or near) a resonant frequency based on window size, then a directional gain effect can occur. The shorter wavelengths of the UHF TV channels generally can be

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[15] *Notice*, *supra* note 2.

expected to pass through windows with less attenuation than signals the wavelengths of which are long compared to window dimensions. Therefore, some structures will have very limited attenuation, while others may have significant attenuation; and this will vary by channel.

The very limited field measurement data in the petitioner's Engineering Statement supports this conclusion, as it showed where the UHF signal outside the hospital was higher than the signal inside the hospital,[16] and several cases where there was only 3 dB decrease[17]. The data provided were for operation between 457 and 469 MHz. The measurement data on the UHF TV channels showed significant variations in the size of the differences; and they cannot be used to estimate the attenuation of the example structures.[18] These data are certainly far from adequate to use to generalize all such structures.

No data are in this record showing the degree of attenuation of hospital structures across the UHF band, much less the generally different construction of other health care facilities. While protection is only guaranteed for the Grade B contour, the FCC must not ignore the viewers in outlying and rural areas who enjoy television in spite of living outside that contour. Indeed, residents in these locations may rely on a hospital that is

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[16] Appendix to Exhibit A (Engineering Statement) attached Petition, at 9. As stated therein, the signal outside the Calvert Hospital for telemetry channel 10 was slightly stronger than the signal strength inside the hospital, in one case.

[17] *Id.*, at 9 and 13.

[18] The "on-floor" measurements were typically higher (second) to much higher (tenth) than the outside measurements, which prevents direct comparison of the impact to a given path. The number and location of the measurements was not large enough to account for local nulls and peaks. The Engineering Statement did not attempt to draw conclusions about the attenuation of the structure other than to state that VHF attenuation is generally higher than UHF attenuation.

between and shared by two communities, as contrasted with large city hospitals which typically are within the Grade B contour of stations licensed to that city.

The type of construction of a major building such as a hospital is significantly different from a wood frame health care facility; they have vastly different attenuation characteristics. Although some structures may have significant attenuation to VHF frequencies, this cannot be relied upon, particularly for use of an unlicensed, uncontrolled Part 15 device. With respect to the lack of separation from residences which would occur if use were permitted in non-hospital locations, even at the current permitted field strengths, VHF cochannel operation would be expected to cause interference to Grade B signal levels unless significant signal attenuation were to occur in the path to the receiving antenna (53dB from the three-meter point, assuming, for simplicity's sake, that the NTSC protection ratios are applicable). A rough calculation of the free space distance from the three-meter point (assuming that is the wall of the medical facility) to obtain 53dB of attenuation is about 1350 meters, or about two square miles of potential interference. The actual area, of course, would vary, depending on broadcast signal levels and local topography.

The Commission seeks comments on what the definition of a "health care facility" should include. To allow transmitters to operate outside of hospital settings makes little practical sense, in that it would be difficult, if not impossible, to determine RF shielding characteristics of each such location, or to require that specific locations meet RF shielding minima. The only practical solution is for these devices to remain within the

hospital environment, unless operation is controlled via a licensed operator and coordinated with other secondary services.

The physical separation between large hospitals and residences significantly reduces the signal level. This factor was a critical part of the Commission's decision allowing the current field strength levels to be as high as they are today. Such considerations are just as important to the final determinations in the instant proceeding.

III. CONCLUSION

Unlicensed devices must have low levels of emissions to avoid interfering with primary services. NAB strongly objects to allowing use of unlicensed medical telemetry devices outside of hospitals, even with the current levels for these devices. The amount of the power increase proposed in this *Notice* is huge, and any future grant of such an increase would move these devices out of the unlicensed class and into the licensed use class with the corresponding checks and balances of such licensed use. While we are sympathetic to the need for medical telemetry, the potential for interference from the proposed unlicensed, unrestricted devices is much too large to accept. Sharing remotely-located TV channels on a non-interfering basis may be one solution for hospital use, provided appropriate, practical controls are in place, and there are channels actually available in enough cities. Shared remote channel use outside of hospitals, where the distance from residences and the building shielding is much less, may be possible, but is less likely to be a viable solution. The petitioner has failed to make the technical case that what is requested is justified, nor has petitioner shown that the proposal would not result in increased interference to other services. No change to Part 15 should be made at this

time. Any future power increases would need to be based on a more persuasive technical record.

Respectfully submitted,

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